

Appl. No. 10/075,406
Amdt. dated February 14, 2002
Reply to Office action of April 18, 2003

REMARKS

Reconsideration of this application is respectfully requested.

In the specification, paragraph [0034] has been amended to correct a minor editorial problem. Reference numeral 302 is changed to 8, consistent with the reference to microstrip line 8 elsewhere in the same paragraph.

Paragraph [0049] is amended to indicate the intermediate and bottom layers of the package. Support is provided in FIG. 1, which shows the layers 4 and 5. Layer 5 is clearly shown as the bottom of the package, and layer 4 is clearly intermediate the substrate 3 and the bottom of the package. No new matter is added.

The drawings were objected to under 37 CFR 1.83(a) as not showing every feature claimed. The Action states that, "the signal wires with a first contact and a second contact on the peripheral, ground plane structure located on opposite sides of the second contact, the intermediate layer formed between the bottom and substrate, and a third ground plane portion and ground openings around a signal wire must be shown."

Applicant respectfully submits that all these features are either shown in the drawings as filed, or the office action has misquoted features of the claims, where the properly recited claim features are shown in the drawings as filed.

An example of a signal wire is a signal trace 8 shown in FIG. 2a.

An example of a first contact 302 is shown in FIG. 2a as a first end of the signal trace 8.

An example of a second contact 303 is shown in FIG. 2a as a second end of the signal trace 8 at the periphery of the substrate 3.

An example of a ground structure is shown in FIG. 2a as item 309. In one example shown in FIG. 2a, this ground structure 309 extends from one corner of the substrate 3 to another corner. For example, the black colored item 309 in FIG. 2a extends from the bottom right corner to the top right corner.

Item 310 of FIG. 2a shows an example of a transition structure 310 that is replicated for each of the signal wirings 8. The Examiner requests that the drawing show "ground plane

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structure located on opposite sides of the second contact," but the claim specifies, "a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring." FIG. 4 shows one example of an enlarged view of the transition 310, including a pair of rectangular ground plane portions 28 located on opposite sides of the second contact 303 of that signal wiring 8. The third ground plane portion 37 is also shown in FIG. 4. Reference numerals are added to FIG. 4 to better show the identity between these items and the same items already shown in the other figures.

With respect to claim 9's recitation of "the intermediate layer formed between the bottom and substrate," layer 4 shown in FIG. 1 is an intermediate layer between the bottom and the substrate 3.

It appears that claim 11 was misread by the Examiner. Claim 11 recites, "a ground opening around a signal via that is coupled to the second contact, the ground opening being generally shaped like a rectangle with two mitered corners." (emphasis added). None of the claims makes any mention of a ground opening around a signal wire. An example of the recited features is shown in FIG. 9. In FIG. 9, each of the ground planes 9, 10 and 11 is shown. The ground planes 9, 10 and 11 have respective openings 9a, 10a and 11a around the signal via 12. Because FIG. 9 is an isometric drawing viewed from the upper right corner, the left of each opening 9a, 10a and 11a can be seen, but the right side of each opening does not appear (and would not appear when the feature is viewed from the upper right corner.). FIG. 9 also shows the miters 9b, 10b and 11b of the openings. In the example of FIG. 9, the ground plane openings 9a-11a are generally shaped like rectangles with two mitered corners 9b-11b on the side of the rectangle closest to the center of the package. The miters 9b-11b on each layer are used to adjust and optimize the insertion and reflection loss of the BGA transition.

The Action further argues that, "it is not clearly shown what or where the signal wires or ground planes are nor does it clearly label what is the signal wire, ground plane or FEP layer (19)."

A replacement sheet is provided for Figure 1, in which the shading is removed make the layers more easily distinguishable. Also, items 25 and 26 are added to FIG. 1, as required by the Examiner. Item 25 is shown in the same position in which it appears in FIG. 4. Item 26 is

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shown in the position described in the specification in paragraph [0041]: "BGA balls 13 and 20 are directly beneath the via holes 12 and 26, respectively." No new matter is added.

As noted above, signal wires 8 are clearly shown. In the replacement sheet for FIG. 1, the FEP layer 19 is also clearly shown.

Therefore, all of the claimed features mentioned in the objection to the drawings were shown, and the objection to the drawings should be withdrawn.

Claims 1-25 were rejected under 35 U.S.C. § 112, first paragraph, as not being enabled. This rejection is respectfully traversed.

As noted above, the first contact can be the first end 302 of a wiring 8, or for example any other pad shape located at the first end. The second contact may be for example, the contact 303 shown in FIG. 2a. FIG. 2a plainly shows the detail 310 in which there is a rectangular ground portion 28 in the plane of wiring 8, above the contact 303 (where the term above is used with reference to the orientation shown in FIG. 2a), and a rectangular ground portion 28 in the plane of wiring 8, below the contact 303. These two rectangular portions are on opposite sides of the contact 303. FIG. 4 is an enlarged perspective view showing the ground portions 28 and 37, where the first and second portions 28 form the sides of a square "U" and third portion 37 forms the bottom of the "U". FIG. 4 also clearly distinguishes the ground plane (28, 37) from the signal wire 8 and the second contact 303.

Note that the transition 310 in FIG. 4 is rotated 90 degrees from the item marked 310 in FIG. 2a. This rotation is of no consequence, as the item in FIG. 4 can correspond to one of the transition structures shown at the bottom of FIG. 2a.

With respect to claim 5, the Action says that it is unclear how the third portions 37 are continuously connected. As shown in FIG. 4 the third portion 37 for one transition 310 forms the bottom section of a square "U" shape. FIGS. 2a and 2b show how a plurality of BGA transitions 310 within the package abutting each other can have continuously connected third portions. The connected third portions 37 form the base of a comb shape 309, with the first and second portions 28 forming the teeth of the comb shape. In FIG. 2a, for each adjacent pair of BGA transitions 310, the rectangular portion 28 between the two second contacts 303 is shared

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(or may be viewed as a pair of abutting rectangular portions that merge into a single rectangular portion).

With respect to claim 9, the Action says it is unclear what is considered the intermediate layer between the substrate and bottom layer. Figure 1 clearly shows the intermediate layer 4 between the substrate 3 and the bottom layer 5.

In view of the foregoing, all of the structures enumerated in the claims are shown and described sufficiently to enable one of ordinary skill in the art to practice the claims. Therefore, withdrawal of the rejection under 35 U.S.C. § 112 is respectfully requested.

Claims 1, 8 and 20-21 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent 5,640,048 to Selna. Applicant respectfully traverses the rejection under § 102.

Claim 1 requires, "

said substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

said substrate having a ground structure including, for each signal wiring, a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring."

Selna fails to disclose or suggest this structure. For example, the Action states that items 200 and 260 constitute the signal wires and items 8b are the ground plane structures. Item 200 is not a signal wire; item 200 is Vss, which is a ground plane. Only item 260 is the Vdd plane or signal plane. Vdd plane 260 is connected to vias 6A. Applicant's claim 1 requires that the second contact be on the periphery of the substrate. Therefore, the peripheral portion or second contact of the Vdd plane must be item 260, and not the interior traces or vias. Selna's ground plane structures 8b are not located on both sides of the Vdd plane 260. Rather, Selna's ground plane structures 8b are interior of the Vdd plane 260, on the same side of the Vdd plane 260.

Selna fails to provide a plan view showing the layout of the various traces if viewed from above, or a description of how the traces would appear if viewed from above. There is no

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suggestion in Selna that if the traces were viewed from above, the plan view would show two rectangular ground plane portions located on opposite sides of the second contact.

Therefore, Selna fails to disclose or suggest a pair of rectangular ground plane portions on opposite sides of each respective second contact, regardless of whether Selna's structure is viewed in cross section (as shown in FIG. 3) or in plan view (not shown by Selna).

In view of the foregoing, Selna fails to disclose or suggest every element of claim 1, and claim 1 is not anticipated. Claims 8 and 20 include the same requirements as claim 1, and should therefore be patentable for the same reasons as set forth above with respect to claim 1.

Applicant respectfully traverses the rejection of claim 21 as being anticipated by Selna. Claim 21 requires, "a superstrate formed of a dielectric material above the substrate, the superstrate having a respective opening therethrough above each second contact." An example of such an opening is shown in original FIG. 4 as item 25 (and in amended FIG. 1). The Action states that the overmold 16 which encapsulates the die is a superstrate as claimed. However, overmold 16 does not have a respective opening over each second contact, where the second contact is on the periphery of the substrate. To the extent that the overmold 16 does not extend to the periphery of the substrate, the space surrounding the overmold 16 might at most be considered a single opening. However, this is not a respective opening above each second contact as required by claim 21. The claim requires each second contact to have its own respective opening. Therefore, claim 21 is not anticipated by Selna.

In view of the foregoing remarks, Applicant submits that this application is in condition for allowance. Early notification to that effect is respectfully requested.

PATENT

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The Assistant Commissioner for Patents is hereby authorized to charge any additional fees or credit any excess payment that may be associated with this communication to deposit account 04-1679.

Respectfully submitted,

Dated:

July 18, 2003

Steven E. Koffs

Steven E. Koffs, Reg. No.: 37,163
Attorney For Applicants

DUANE MORRIS LLP

One Liberty Place

Philadelphia, Pennsylvania 19103-7396

(215) 979-1250 (Telephone)

(215) 979-1020 (Fax)